

**OBSERVATIONS ON TWELVE FAMILIES OF HOMOPTERA IN MACAO,
SOUTHEASTERN CHINA, FROM 1989 TO THE PRESENT**

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Abstract.—The insect species found in present day Macao are largely those feeding upon small numbers of remnant agricultural plantings or on those plants representing the subtropical evergreen broad leaf forest or remnants of the tropical monsoon rainforest as agricultural crops are only grown on a small scale. Records of 37 species of Homoptera of the Aleyrodidae, Aphididae, Cicadellidae, Cicadidae, Coccidae, Delphacidae, Diaspididae, Flatidae, Fulgoridae, Margarodidae, Pseudococcidae and Psyllidae are listed for the Portuguese territory of Macao of which 27 are new records.

Key Words: Macao, Homoptera, faunal list

In the early part of the present century a number of homopteran species were listed as occurring in Macao and Hong Kong as well as part of the Guangdong Province of mainland China all of which was known at that time as South China (Kirkaldy 1909). Rice was considered the main agricultural crop and farming was the chief livelihood of most of the people in south east China. The land area that John C.W. Kershaw (Kirkaldy 1909) collected insects on was considered an island at that time but it is now connected to the mainland of China and today is considered the peninsula. The majority of the collections made in this study, however were taken from the islands of Taipa and Coloane which are connected to the peninsula either by two bridges (Taipa) or a causeway (Coloane) which did not exist in the early part of the century. Many of the insect species noted to occur in Macao at the beginning of the century may now be non-existent. We were unable to find evidence, for example, of the planthoppers described by Frederick Muir (1913) because of modernization and construction of hotels

and apartment complexes that have replaced agricultural farmlands. Easton and Pun (1997) discussed the species of true bugs in the region and here we discuss the Homoptera.

MATERIALS AND METHODS

Insects were sampled routinely from the walls of window-lit buildings (Taipa island) that are often illuminated at night. Other insect groups less sensitive to light, such as the cicadas other than those in the genera *Cryptotympana*, and *Huechys*, as well as the Flatidae, Fulgoridae and the scale insects, were sampled with an insect net from trees, shrubs and grasses in forested areas on the islands of both Coloane and Taipa as well as from the peninsular area connected to the Guangdong region of China. The names of the plant hosts follow the Macau Catalogue of plants and their addenda (1991). Voucher specimens of the Homoptera named here are housed in the Entomology Museum of the Agrarian Services on Coloane (Seac Pai van Park) under the curatorship of the second author.

LIST OF SPECIES

HOMOPTERA

Aleyrodidae

Aleurocanthus spiniferus (Quaintance), orange spiny whitefly. No date, collector unknown, NEW RECORD, Coloane Island, Macao, ex. *Ficus rumphi*, *Rosa chinensis*. Mound and Halsey (1978) list it from India, Sri Lanka, Taiwan, Thailand, Malaysia, Philippines, Sumatra, Japan, and Hong Kong, while Peng and Liu (1992) report it from the Fujian, Guangxi, Henan, Hunan, Jiangsi, and Zhejiang provinces of China.

Trialeurodes vaporariorum (Westwood), greenhouse whitefly. No date, collector unknown, NEW RECORD. Coloane Island, Macao, ex. *Brassica oleracea*, *Citrus medica* and *Hybiscus rosa-sinensis*. Mound and Halsey (1978) list it from Malaya, India, Sri Lanka, Hawaii, New Guinea, New Zealand and most of the provinces of mainland China.

Aphididae

Aphis gossypii Glover, cotton or melon aphid. 5 Dec 1992, PWW leg. NEW RECORD, Coloane Island, ex. *Althaea rosea*, *Capsicum frutescens*, *Chrysanthemum morifolium*, *Citrullus lanatus*, *Colocassia esculenta*, *Cucurbita moschata*, *Dianthus caryophyllus*, *Hibiscus rosa-sinensis*, *Lilium japonicum*, *Litchi chinensis*, *Phaseolus radiatus*, *Psidium guajava*, *Punica granatum* and egg plant, *Solanum melongena*. It has been reported in Hong Kong (Lee and Winney 1981) and is widely distributed in China (Peng and Liu 1992).

Aphis nerii Boyer de Fonscolombe, nerium or oleander aphid. 5 Dec 1992, PWW leg. NEW RECORD, Coloane Island, Macao, ex. *Asclepius curassavica*, *Nerium indicum*. Raychaudhuri (1980) lists it throughout India and Japan, Java, Korea, and Taiwan. In Hong Kong, Lee and Winney (1981) report it common during winter months when it feeds on the shoots and leaves of oleander. Peng and Liu (1992) list

it from Guangdong, Guangxi, Hunan, and Jiangsu provinces of China.

Formosaphis micheliae Takahashi. 21 March 1995, PWW leg. NEW RECORD, Coloane Island, Macao, ex. white jade orchid tree, *Michelia alba* and *M. champaca*. Blackman and Eastrop (1994) record it from Japan and Taiwan and Lee and Winney (1981) found it in Hong Kong.

Myzus persicae (Sulzer), green peach aphid. No date or collector, NEW RECORD, Coloane Island, Macao, ex. *Brassica chinensis*, *B. oleracea* and *Prunus persica*. This is considered a cosmopolitan temperate species and it is more common during winter months in Hong Kong with populations declining after April (Hill et al. 1982). It is widely distributed in China.

Neophyllaphis podocarpi Takahashi, buddhist pine aphid. 9 Feb 1995, PWW leg. NEW RECORD, Coloane Island, Macao, ex. *Podocarpus macrophyllus*. Distribution includes Malaysia, Taiwan, Hong Kong, Japan and the Guanxi, Hunan, Jilin, and Zhejiang provinces of China (Peng and Liu 1992).

Shivaphis celti B. Das. 17 March 1994, PWW leg. NEW RECORD, Coloane Island, Macao, ex. *Celtis sinensis*. Distribution includes Korea, Japan, India, Taiwan, Hong Kong and the Fujian, Guangdong, Guangxi, Guizhou, Hebei, Hunan, Jiangsu, Liaoning, Shandong, Sichuan, and Yunnan provinces of China (Peng and Liu 1992).

Tinocallis kahawaluokalani (Kirkaldy), crepe myrtle aphid. 27 Oct 1993, PWW leg. NEW RECORD, Coloane Island, Macao, ex. *Lagerstroemia indica*. This species is also found in India, Taiwan, Japan, and Hawaii (Raychaudhuri 1980).

Cicadellidae

Lodiana brevis (Walker), yellow-banded leafhopper. 9 Dec 1993. Ng Wai Man leg. NEW RECORD, Coloane Island, Macao, ex. *Cinnamomum camphora*, *Ficus microcarpa* and *Euphoria longan*. In Hong Kong Lee and Winney (1981) reported it from *Citrus* sp. Distribution includes the Guang-

dong, Guizhou, and Yunnan provinces of China as well as India, Taiwan, Malaysia, Thailand, and Japan (Datta 1988).

Nephotettix virescens (Distant), green rice leafhopper. No date or collector, NEW RECORD, Coloane Island, Macao, ex. *Citrus* sp., *Bambusa* sp., and *Saccharum officinarum*. There are records of it from rice in the Tai Lung farm insect collection in Hong Kong and Hill (1975) lists it as a pest of rice in India and China.

Petaloccephala chlorocephala Walker. 4 Sept 1993, Ng Wai Man leg, NEW RECORD, Coloane Island, Macao, no host data.

Tettigoniella spectra (Distant), rice white leafhopper. 15 Sept 1992, Ng Wai Man leg, NEW RECORD, Coloane Island, Macao, ex. *Morus alba*, *Oryza sativa*, *Saccharum officinarum*. Distribution includes Taiwan, India, and Japan as well as the Guangdong and Hunan provinces of China (Peng and Liu 1992).

Another species of leafhopper, *Dryadomorpha pallida* Kirkaldy has not been collected in our study but Webb (1981) reported it from Macao and Hong Kong as well as the neighboring areas of India, Bangladesh, Taiwan, Japan, Laos, and the Philippines.

Cicadidae

Cryptotympana atrata (F.), large brown cicada. 20 June 1994. Cheong Chi Kong leg, Coloane island, Macao, ex. *Melia azedarach*, *Morus alba*, *Tectonis grandis*. Emergence of adults occurs from late May through early July in general but emergence on Taipa Island in 1998 was earlier (May 15). Distribution includes Hong Kong, the provinces of Guangdong, Hebei, and Zhejiang of China (Wu 1935) as well as Malaysia, Japan, and Taiwan.

Cryptotympana mandarina Distant. May 1997, 15 May 1998, ERE leg, Taipa Island, Macao. Kershaw (1903) is believed to be the first to record it from Macao while Kirkaldy (1909) reported it from Hong Kong. Nymphal skins have been observed on the

trunks of various trees such as *Acacia confusa* and *Casuarina equisetifolia* in the municipal cemetery on Taipa island (Easton 1992) as well as the foxglove tree, *Paulownia fortunei* on Guia Hill of Macao peninsula in May, 1997 and on *Hibiscus tiliaceus* near the Monte Forte, Fortress, May 10, 1998. Emergence holes near the base of the trees indicated where the nymphs left the soil. Watery fluid has been observed emitting from the anal region of resting adults on Taipa Island suggesting that they had recently emerged from the ground. As feeding in adults has not been documented, the watery fluids may have accumulated while the nymphs were underground and release may be necessary before sound production can take place. Distribution also includes the Guangdong and Hainan provinces of China and Taiwan.

Chremistica ochracea (Walker). 23 May 1995, 10 May 1998, ERE leg, Taipa Island, Macao. Hayashi (1977) recorded this species from Macao, and Hill et al. (1982) illustrated it as the green clearwing cicada under the genus *Dundubia* in Hong Kong. Distribution also includes Taiwan and the Guangdong region of China.

Gaeana maculata Walker, yellow-spotted black cicada. 14 April 1994, Ng Wai Man leg, Coloane Island; 7 May 1998, ERE leg, Guia Hill, Macao peninsula. In the Seac Pai Van agricultural park on Coloane Island, nymphs were observed emerging as early as March 25 (Easton 1992). It has not been observed on Taipa island suggesting certain food plants may be necessary for nymphal development. In Hong Kong, Cheung and Marshall (1973) reported it from *Schinus terebinthifolius*, Christmas berry tree, and *Paulownia tormentosa* and in Macao the senior author has observed it among the foliage of *Pawlownia fortunei* on the Guia Hill. Wu (1935) recorded it from Myanmar (Burma), Assam area of India, Vietnam, and Guangxi Province of China.

Huechys sanguineus (DeGeer), red-nosed cicada. 31 August 1992, Ng Wai Man leg, Coloane Island, Macao. Kirkaldy (1909)

first reported this species from Macao and Hong Kong. From 1989–1997 emergence from the ground has always been later in the year than with the former species and from September through December (Easton 1991). In 1998 however an emergence of 15–20 individuals was observed in an arboretum on Coloane island on May 10. Specific food plants have not been associated with nymphal feeding.

Mogannia hebes (Walker), grass cicada. 9 June 1994, ERE leg, NEW RECORD, Taipa Island on shrub on university campus; June 1996, May 1998, ERE leg, Seac Pai Van Agricultural Park, Coloane Island. Kirkaldy (1909) was probably the first to record it from Hong Kong, and Hayashi (1976) described its feeding on the stems of *Miscanthus* grass where females oviposit into stems and leaf midribs from April to June. Distribution includes Korea, India, Myanmar, and the Chejiang, Fujian, Guangdong, Guangxi, Jiangsi, Hunan, Sichuan, and Yunnan provinces of China.

Mogannia nasalis (White). 25 May 1966, ERE leg, Taipa Island, Macao on tree foliage along hiking trail in thickly forested hillside. This species was first recorded in Macao and Hong Kong by Kirkaldy (1909). It is also found in the Assam area of India.

Platypleura hilpa Walker, spotted brown cicada. 2 August 1992, PWW leg, Coloane Island, Macao. Nymphs were observed emerging at night near the trunks of *Casuarina equisetifolia* trees near the municipal cemetery on Taipa Island (Easton 1992). Kirkaldy (1909) reported it from Hong Kong and Macao, and it is also found in the Guangdong and Hunan provinces of China (Peng and Liu 1992).

Coccidae

Ceroplastes ceriferus (Fabricius), indian wax scale. 18 Dec 1992. PWW leg, NEW RECORD, Coloane Island, Macao, ex. *Cinnamomum camphora*, *Melastoma sanguineum*, *Michelia figo*, *Morus alba*. Tang (1991) listed it from Australia and Hawaii and it is also found in Japan, India, Sri Lan-

ka and provinces of China south of the Yangtze River.

Saissetia coffeae (Walker), helmet or hemispherical scale. 19 Jan 1988, PWW leg, NEW RECORD, Coloane Island, Macao, ex. Fukien tea, *Carmona microphylla* and sago palm, *Cycas revoluta*. Hill (1975) listed citrus, guava and mango as alternate hosts but mainly it is found on coffee plants and widespread in the tropics including southeastern Asia.

Delphacidae

Nilaparvata lugens (Stål), brown planthopper of rice. 22 Oct 1997, ERE leg, NEW RECORD, Taipa Island on window ledges and outside on floors of university campus buildings illuminated by lights. According to Hill (1975) and Wada et al. (1987), *N. lugens* invades Japan with the monsoon winds every year from China, so the large numbers (1,000+) observed in Macao over a brief period of 1–2 days suggests that the insects migrated from the neighboring Guangdong Province since rice is not grown commercially locally in Macao as a crop. In Malaysia and Indonesia, it is a major pest of rice and produces a browning effect on the plants known as "hopperburn." Lee and Winney (1981) also report it from *Gladiolus gandavensis* in Hong Kong. Yang (1989) gives its distribution as Australia, New Guinea, India, Korea, Taiwan, Philippines, Vietnam, and the Pacific islands of Fiji, Guam, Yap, and Palau, while Kuoh et al. (1983) list it from Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Honan, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shandong, Shanxi, Yunnan, and Zhejiang Provinces in China.

Other species of Delphacidae reported earlier by Muir (1913), such as *Belocera sinensis* Muir, *Phyllodinus macaoensis* Muir, and *Tropidocephala saccharivorella* Matsumura, were not collected in this study and may no longer be found locally due to

the urbanization which has replaced agricultural crops.

Diaspididae

Aulacaspis rosarum Borchsinius, Asiatic rose scale. No date or collector, NEW RECORD, Coloane Island, Macao, ex. *Rosa chinensis*. Distribution includes the Fujian, Guangdong, Guangxi, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Yunnan, and Zhejiang provinces of China (Peng and Liu 1992).

Aulacaspis yabunikkei Kuwana. 21 April 1988, PWW leg, NEW RECORD, Coloane Island, Macao, ex. *Cinnamomum camphora*. In Hong Kong, Lee and Winney (1981) also record it from pond spice, *Litsea glutinosa*. Distribution includes Japan and the Guangdong, Guizhou, Hunan, Sichuan, Yunnan, and Zhejiang Provinces of China (Peng and Liu 1992).

Hemiberlesia pitysophila Takagi. 7 June 1988, PWW leg, NEW RECORD, Coloane Island, Macao, ex. *Pinus mansoniana*.

Lepidosaphes laterochitinosus Green. 20 May 1997, PWW leg, NEW RECORD, Coloane Island, Macao, ex. *Osmanthus fragrans*, Kwai-Fah. In Hong Kong there are records of it from this host as well as *Schefflera octophylla*, Ivy tree, in the Tai Lung Farm insect collection.

Parlatoria pergandii Comstock, chaff scale. 23 Feb 1993, Yau H.C. leg, NEW RECORD, Coloane Island, Macao, ex. *Jasminium sambac* and *Citrus* sp. Distribution in the world is widespread, but in Asia it has been recorded from Australia, New Zealand, Japan, India, Philippines, Taiwan, and from the Anhui, Fujian, Guangdong, Guangxi, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsi, Jiangsu, Liaoning, Qinghai, Shanxi, Shaanxi, Shanghai, Sichuan, Yunnan, and Zhejiang Provinces of China (Peng and Liu 1992).

Pseudaulacaspis cockerelli (Cooley), oyster or oleander scale. 7 May 1988, PWW leg, NEW RECORD, Coloane Island, Macao, ex. *Michelia alba*, *M. figo* and coconut palm, *Cocos nucifera*. In Hong

Kong, there are also records from bamboo palm, *Chrysalidocarpus lutescens* (Lee and Winney 1981). Its distribution includes Thailand, Taiwan, and the Guangdong, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Yunnan, and Zhejiang provinces of China (Peng and Liu 1992).

Flatidae

Lawana imitata (Melichar), white moth bug. 18 July 1991, PWW leg, Coloane Island, Macao, ex. *Bauhinia* sp., *Euphoria longan*, *Hibiscus tiliaceus*, *Jasminium mesnyi*, *Litsea monopetala*, *Murraya paniculata*, and *Pittosporum tobira*. This insect is very common in lychee fruit tree orchards near Shenzhen in the Guangdong region of China. Easton (1992) reported it from the Seac Pai Van Agricultural Park in Macau. Its distribution also includes the Hainan, Hunan, Guizhou, Guangxi, and Yunnan provinces of China, Japan (Peng and Liu 1992) as well as Hong Kong (Lee and Winney 1981).

Seliza lignaria (Walker). 9 May 1997, ERE leg, NEW RECORD, Taipa Island, Macao, ex. *Miscanthus* grass along hiking trail in recently burned vegetation. Fennah (1956) listed it from Hong Kong and the Guangdong province of China, and it is also believed to occur in the Anhui, Fujian, Guizhou, Hunan, Sichuan, Yunnan, and Zhejiang provinces of China and India (Peng and Liu 1992).

Medler (1992) reported *Salurnis marginella* (Guérin-Meneville) and *Geisha distinctissima* (Walker) as occurring in Macao in the early part of this century, but we have been unable to document their presence in this study.

Fulgoridae

Fulgora candelaria (L.), lantern fly or lantern bug. 2 May 1994, Cheong Pak Fai leg, Coloane Island; 10 Dec 1990, ERE leg, Guia Hill near lighthouse, Macao Peninsula, ex. *Litchi chinensis*, *Euphoria longan*, *Morus alba*, *Sapium sebiferum*. Kershaw

and Kirkaldy (1910) were probably the first to describe, illustrate, and discuss the life history stages in the area known as South China which includes Hong Kong and Macao. Even though four host plants are given above, Kershaw and Kirkaldy (1910) felt that *E. longan* and mango trees were the most important for the reproduction of this species. Its distribution also includes India (Assam), Cambodia and the Hainan, Hunan, Guangdong, Guangxi, and Sichuan provinces of China.

Zanna chinensis (Distant). 31 Aug 1990, ERE leg, Taipa Island, Macao, ex. *Casuarina equisetifolia*, horsetail tree. There are also records of this species in Hong Kong from the Tai Lung Farm insect collection. Wu (1935) recorded it from the Naga Hills area between India and Myanmar (Burma).

Margarodidae

Icerya purchasi Maskell, cottony cushion scale. 10 Feb 1994, PWW leg, Coloane Island; 12 May 1997, ERE leg, Taipa Island, NEW RECORD, ex. *Cassia surattensis*, the sunshine tree, *Acacia confusa*, *Acalypha wilkesiana*, *Casuarina equisetifolia*, *Hypericum chinense*, Chinese St. Johnswort, and *Pentas lanceolata*. In Hong Kong, Lee and Winney (1981) reported this species from *Rosa* spp. and *Citrus limonia*, Chinese lemon. It has a widespread distribution including Japan, Korea, Philippines, Indonesia, Malaysia, and Sri Lanka in southeastern Asia, including the Gansu, Guizhou, Heilongjiang, Hunan, Ningxia, Qinghai, and Xinjiang provinces of China (Peng and Liu 1992).

Pseudococcidae

Maconellicoccus hirsutus (Green), Asian hibiscus mealybug. 16 June 1988, PWW leg, NEW RECORD, Coloane Island, Macao, ex. *Hibiscus rosa-sinensis*. In Hong Kong, it has been reported from Cuban bast, *H. tiliaceus*. Williams (1996) listed it from Bangladesh, Brunnei, Myanmar (Burma), Cambodia, India, Indonesia, Laos, Malaysia, Nepal, Pakistan, Philippines, Sri

Lanka, Thailand, and China in southeastern Asia.

Psyllidae

Macrohomotoma striata Crawford, fig shoot psyllid. 29 Dec 1993, PWW leg, NEW RECORD, Coloane Island, Macao, ex. *Ficus microcarpa* and *Ficus retusa*. In Hong Kong, Hill and Cheung (1978) described small waxy colonies inhabiting apical and lateral shoots of twigs and branches. Hollis and Broomfield (1989) reported it from India and Hodkinson, (1986) listed it from Ryukyu Is.

In the family Tropiciduchidae Lee and Winney (1981) reported *Kallitaxila macaoana* (Muir) in Hong Kong, but we have not collected it in this study even though the original type locality was in Macao (Muir 1913).

ACKNOWLEDGMENTS

The authors thank Clive S.K. Lau and Stephen Lai Yue-hong, agricultural officers, Hong Kong Government, for allowing one of us (ERE) access to their insect collection on the Tai Lung Farm near Sheung Shui, New Territories. We are also grateful for species determinations of the Flatidae by John T. Medler of the B.P. Bishop Museum, Honolulu, Hawaii, and to J.P. Duffels, Zoologisch Museum, Instituut voor Systematiek en Populatiebiologie, Amsterdam, The Netherlands, for determination of the cicadidae. The delphacid planthopper was identified by Yang Jeng-Tze of the Department of Entomology, National Chung Hsing University, Taichung, Taiwan.

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